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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/002,913	10/23/2001	Makoto Kitabatake	10873.830US01	8598

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EXAMINER

ABRAHAM, FETSUM

ART UNIT PAPER NUMBER

2826

DATE MAILED: 12/19/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/002,913

Applicant(s)

KITABATAKE, MAKOTO

Examiner

Fetsum Abraham

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-4, 6-11, 13 and 14 is/are rejected.
- 7) ☒ Claim(s) 5, 12 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

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Claims rejection

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. **Claims 8-11 are rejected under 35 U.S.C. 102(b) as being anticipated by Mihara (4,823,172).**

The patent discloses a power IC in the front page composed of a field effect transistor including source region (6) with source electrode ((11) on the first surface of the substrate, a drain electrode (12) on the second surface of the substrate, a first conductivity type (n-type) drift (3) in the substrate body, a second conductivity type region (4,5) included in the substrate, a schottky diode (14) formed by contact between the first conductivity type drift (3) and a metal electrode (11), the diode and the MOSFET formed such that there is no second conductivity type region between them.

As for claim 9, the duplicated MOSFET structure is shown similarly by the prior art as the two transistors are separated by the schottky diode and the MOSFETs are insulated gate transistors.

The recess in claim 10 and the associated claimed layers or regions are shown by the prior art as the recess penetrated down to the drift region through the first conductivity type source (6) and the and the second semiconductor type channel regions (4,5). Further, the source inside the

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second conductivity type channel and the second conductivity type channel are in contact with the source electrode (11).

As for claim 11, the schottky contact (14) is located exactly at the claimed location, between the source electrode (11) and the schottky electrode (11). Please note that electrode (11) has a multi-purpose electrode common to the source and the diode.

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. **Claims 1-4,6,7,13,14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mihara.**

As for claim 1, the patent discloses a power IC in the front page composed of a field effect transistor including source region (6) with source electrode ((11) on the first surface of the substrate, a drain electrode (12) on the second surface of the substrate, a first conductivity type (n-type) drift (3) in the substrate body, a second conductivity type region (4,5) included in the substrate, a schottky diode (14) formed by contact between the first conductivity type drift (3) and a metal electrode (11), the diode and the MOSFET formed such that there is no second conductivity type region between them.

Clearly every claimed element is in the prior art but the depletion effects in claim 1. However, since the structure is similar to the claimed invention, a depletion caused by the

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schottky effect is likely to expand in the closest environment at the substrate surface and join with depletion caused by the second conductivity type channel as a matter of inherence to the to at these types of devices.

As for claims 2,3, the duplicated MOSFET structure is shown similarly by the prior art as the two transistors are separated by the schottky diode and the MOSFETs are insulated gate transistors.

As for claim 4, the recess in claim 10 and the associated claimed layers or regions are shown by the prior art as the recess penetrated down to the drift region through the first conductivity type source (6) and the and the second semiconductor type channel regions (4,5). Further, the source inside the second conductivity type channel and the second conductivity type channel are in contact with the source electrode (11).

As for claims 6,7,13,14, Mihara may not have uses the claimed material as the body of the structure, however, it would have been obvious to one skilled in the art to use SiC material as the substrate of the structure, since the material falls into the range of semiconducting class that can interchangeably be used with other known materials, specifically when different work function is required for a given circuit compared to the most common materials such as silicon.

Claims 5,12 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

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The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.


Refer to PN: 4,6431,163.

Any inquiry concerning this communication should be directed to Fetsum Abraham at telephone number (703) 305,3793, or by E-mail at *fetsum.abraham@uspto.gov*.

Any inquiry of a general nature or relating to the status of this application should be directed to the *SPE of AU:2826* at (703)308-6601, or the *Group receptionist* at (703) 308-0956.

Fetsum Abraham

12/11/02


FETSUM ABRAHAM
PRIMARY EXAMINER